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EXAMINER

SHAH, PARAS D

ART UNIT

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2626

NOTIFICATION DATE

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 10/721,271	Applicant(s) OH ET AL.	
	Examiner Paras Shah	Art Unit 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02/05/2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-15, 18-22 and 24-31 is/are rejected.
- 7) ☒ Claim(s) 6, 16, 17, 23, 32 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/05/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This communication is in response to the Arguments filed on 02/05/2008. Claims 1-33 remain pending and have been examined. The Applicants' amendment and remarks have been carefully considered, but they are not persuasive and do not place the claims in condition for allowance. Accordingly, this action has been made FINAL.
2. All previous objections and rejections directed to the Applicant's disclosure and claims not discussed in this Office Action have been withdrawn by the Examiner. Further, the IDS submitted on 02/05/2008 has been considered by the Examiner.

Response to Arguments

3. Applicant's arguments filed on 02/05/2008 (pages 2-8) have been fully considered but they are not persuasive.

As to claim 1, the Applicant argues first argue that the combination of Kushner in view of Durlach do not teach the limitation of "a whitening unit for combining white noise with the frames input from the preprocessing unit. The Examiner traverses this argument. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Further, Kushner was cited to teach the preprocessing unit for dividing a signal into frames (See col. 4, lines 6-7). Further, the Durlach reference was combined to teach the limitation of adding white noise to a signal (see Durlach col. 5, lines 56-65

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and Figure 2, target signals (speech) 50a, 50b, and 50n are added with the noise generator 60 by mixer 56). Durlach teaches adding noise to a signal. The signal can be segmented when noise is added as processing occurs once the signal is received (see Durlach Figure 2). Hence, the stated limitations are taught by the combination of Kushner in view of Durlach.

In response to the second argument, regarding the use of white noise as being well known in the art is an improper Official Notice. The Examiner traverses this argument by showing that the use of white noise insertion is common in the art. Specifically, this is seen in patent 5,768,474 by Neti in col. 6, lines 4-29. Further, motivation is also given for adding noise in order to produce a realistic noise environment (see col. 6, lines 24-34) where speech distortion may occur. Hence, the adding of white noise is common when simulating noisy environments.

In response to the third argument presented by the Applicant, the Applicant argues that one skilled in the art would have no motivation to combine Kushner and Durlach since Durlach uses multiple microphones and Kushner only one. The Examiner traverses this argument by reciting col. 5, lines 54-col. 6, lines 16. In the cited sections, directional information with content information is input into a microphone. It should be noted that $S_1(t)$ to $S_n(t)$ time varying signal exists. If $n=0$ then we have the single signal case. Hence, in this case one microphone is needed, which in this example is 50a. As stated by the Applicant, the Kushner reference includes a single microphone and hence the combination with Durlach would not change the principle operation as the applicant

suggests since when $n=0$ the single microphone case occurs. Hence, such a combination is sufficient.

In response to the fourth argument presented by the Applicant, the Applicant argues that Eryilmaz does not teach the extraction of random parameters indicating frame randomness. The Examiner traverses this argument. Eryilmaz does teach the random parameter extraction unit (see col. 2, lines 30-42, speech energy value determined) for extracting random parameters indicating the randomness of frames (see col. 2, lines 30-55, voice activity is detected based on the comparison to a threshold. The determination of energy is random since it is not known whether the frame is voice or noise. Further, the randomness is addressed by indicating the noise or voice present in the signal). The indication of voice activity is in itself random since it is unknown when passing making a determination of speech or noise. The random parameters are extracted and are the energy value determined for the frame (see col. 4, lines 5-18, especially equation 1). Hence, for a series of frames or frame a different energy value may exist which indicates whether speech is present or not. It is determined that speech exists when above thresholds and non-speech when not within the threshold (see col. 2, lines 38-54). Hence, the extraction of random parameters indicating randomness of frames is taught by the cited reference.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was

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within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 18, 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kushner *et al.* (US 6,862,567) in view of Durlach *et al.* (US 5,828,997) in view Eryilmaz (US 5,867,574).

As to claims 1 and 18, Kushner *et al.* teaches a voice region detection apparatus, comprising:

a preprocessing unit for dividing an input voice signal into frames (see col.4, lines 6-7, segments acquisition window into frames.);

a frame state determination unit for classifying the frames into voice frames and noise frames (see col. 4, lines 29-37, speech/noise classifier done by microprocessor 110) based on the random parameters extracted by the random parameter extraction unit; and

a voice region detection unit (see col. 5, lines 9-14, microprocessor 110) determines the starting point and ending point of the speech utterance.) for detecting a voice region by calculating start (see col. 6, lines 8-9 and Figure 2, microprocessor 110 determines the starting point and ending point of the speech utterance) and end positions of a voice based (see col. 6, lines 65-66 and Figure 2, endpoint is determined) on the voice and noise frames input from the frame state determination unit (e.g. From the determination of a speech utterance the voice regions are detected based on energy.).

However, Kushner *et al.* does not specifically teach the whitening unit for combining white noise to the input frames.

Durlach *et al.* does teach the whitening unit combining white noise to the input frames (see col. 5, lines 56-65 and Figure 2, target signals (speech) 50a, 50b, and 50n are added with the noise generator 60 by mixer 56). Although white noise is not used when adding to the target signals, it would have been obvious to add white noise to a signal or any other type of noise depending on environment simulated.

It would have been obvious to one of ordinary skilled in the art at the time the invention was made to have modified the voice recognition as taught by Kushner *et al.* with the addition of a whitening unit as taught by Durlach *et al.* The motivation to have combined the references involve the ability to incorporate the directionality of a signal for sound localization (see Durlach *et al.*, col. 5, lines 60-

65) as would benefit the preprocessed signal from Kushner *et al.* for real-time environmental simulation.

However, Kushner *et al.* in view of Durlach *et al.* do not specifically teach the random parameter extraction unit.

Eryilmaz does teach the random parameter extraction unit (see col. 2, lines 30-42, speech energy value determined) for extracting random parameters indicating the randomness of frames (see col. 2, lines 30-55, voice activity is detected based on the comparison to a threshold. The determination of energy is random since it is not known whether the frame is voice or noise. Further, the randomness is addressed by indicating the noise or voice present in the signal).

It would have been obvious to one of ordinary skilled in the art at the time the invention was made to have modified the voice recognition as taught by Kushner *et al.* in view of Durlach *et al.* with the addition of random parameter extraction unit as taught by Eryilmaz for the purpose of classifying the voice frames and noise frames as taught by Kushner *et al.* in view of Durlach *et al.* by a method for classification.

As to claim 2 and 19, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz teach all of the limitations as in claims 1 and 18 above.

Furthermore, Kushner *et al.* teaches wherein the preprocessing unit samples the input voice signal according to a predetermined frequency (see col. 3, lines 66-col. 4, lines 10, digitize) and divides the sampled voice signal into a

plurality of frames (see col. 4, lines 4-10, segmentation into frames is performed.)
(e.g. The digitization of the voice signal makes the use of sampling frequency obvious as the signal is sent to the microprocessor for further processing. It is obvious that this sampling frequency is utilizing the Nyquist criterion.)

As to claim 4 and 21, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz teach all of the limitations as in claims 1 and 18 above.

Furthermore, Durlach *et al.* teaches wherein the whitening unit comprises a white noise generation unit (see Figure 2, noise generator 60) for generating the white noise, and a signal synthesizing unit (see Figure 2, mixer 56) for combining the frames input from the preprocessing unit (see signals 50a, 50b, and 50n) with the white noise generated by the white noise generation unit (e.g. Noise is added to the target signal.).

6. Claims 3 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz as applied to claims 2 and 19 above, and further in view of Mekuria (US 6,182,035).

As to claims 3 and 20, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz teach all of the limitations as in claims 2 and 19 above.

However, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz do not specifically teach the frames overlapping with one another.

Mekuria does teach the overlapping of frames (see col. 8, lines 28-29).

It would have been obvious to one of ordinary skilled in the art at the time the invention was made to have combined voice recognition as taught by Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz with the overlapping of frames as taught by Mekuria. The motivation to have combined the references involves the use of samples in more than one frame (see Mekuria col. 8, lines 28-29).

7. Claims 5 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz as applied to claims 1 and 18 above, and further in view of Davis *et al.*(US 2003/0216909).

As to claim 5, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz teach all of the limitations as in claim 1 and 18 above.

Furthermore, Durlach *et al.* does teach the whitening unit combining white noise to the input frames (see col. 5, lines 56-65 and Figure 2, target signals (speech) 50a, 50b, and 50n are added with the noise generator 60 by mixer 56).

Furthermore, Eryilmaz does teach the random parameter extraction unit (see col. 4, lines 30-42, speech energy value determined).

However, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz do not specifically teach wherein the calculation of the numbers of runs (see [0046], consecutive frames that fulfill the energy threshold.

Davis does teach wherein the calculation of the numbers of runs (see [0046], consecutive frames that fulfill the energy threshold.(If x number of frames

meet the requirement than it is determined that speech is present, otherwise noise or non-speech is present.) consisting of consecutive identical elements in the frames.

It would have been obvious to one of ordinary skilled in the art at the time the invention was made to have combined voice recognition as taught by Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz with consecutive runs of the random parameter as taught by Davis *et al.* The motivation to have combined the references involves the ability for the VAD processor to produce the chance for short-term events triggering a VAD state change (see Davis *et al.* [0046]).

8. Claims 7-9 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz as applied to claims 1 and 18 above, and further in view of Pastor (US 5,572,623).

As to claims 7 and 24, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz teach all of the limitations as in claims 1 and 18, above.

However, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz do not specifically teach the voice frames including vocal frames and fricative frames.

Pastor does teach the frames including vocal and fricative frames (see col. 4, lines 66-67 and col. 5, lines 5-14).

It would have been obvious to one of ordinary skilled in the art at the time the invention was made to have combined the voice recognition as taught by

Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz with the inclusion of fricative frames as taught by Pastor. The motivation to have combined the references involves the inclusion of fricatives that are present in at the start and end of speech (see Pastor col. 1, lines 29-33).

As to claims 8, 9, 25, and 26, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor teach all of the limitations as in claims 7 and 24, above.

Furthermore, Eryilmaz teaches wherein the frame state determination unit (e.g. voice activity detector) determines if the random parameter of a frame extracted by is below a first threshold (see col. 2, lines 30-55, voice activity is detected based on the comparison to a threshold.) The determination of energy is random since it is not known whether the frame is voice or noise.) then it is a vocal frame (e.g. If the noise is below the value of the threshold, then speech is present or vocal frame. The use of a specific threshold would have been obvious to one skilled in the art in order to distinguish voice from noise. Hence, the use of below or above a threshold is matter of design choice and relativity. The Applicants do not indicate reasons for selecting the stated thresholds (see Applicant's Specification, page 11, lines 17-21).

9. Claims 10, 11, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of

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Pastor as applied to claims 8 and 25 above, and further in view of Chong-White *et al.* (US 7,065,485).

As to claims 10, 11, 27, and 28, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor teach all of the limitations as in claims 8 and 25, above.

However, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor do not specifically teach if the random parameter of a frame extracted by the random parameter extraction unit is above a second threshold, the relevant frame is a fricative frame.

Chong-White *et al.* does teach if the random parameter of a frame extracted by the random parameter extraction unit (see col. 7, lines 22-25, energy ratio computed, similar to Eryilmaz) is above a second threshold (see col. 7, lines 46-47, fricatives identified when above a threshold), the relevant frame is a fricative frame. As to claims 11 and 28, it would have been obvious to select a threshold value for comparing different types of values of a signal with respect to a ration.

It would have been obvious to one of ordinary skilled in the art at the time the invention was made to have combined the voice recognition as taught by Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor with the inclusion of a threshold indicating a fricative as taught by Chong-White *et al.* The motivation to have combined the references involves the ability to detect further unvoiced components in a signal consisting of speech and non-speech.

Furthermore, the use of the voice recognition as taught by Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor allows the ability to detect noise, voice and fricatives contained in the signal.

As to claims 12, 13, 29, and 30, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor in view of Chong-White teach all of the limitations as in claims 8 and 25, above.

Furthermore, Eryilmaz teaches wherein the frame state determination unit determines that if the random parameter of the frame extracted by the random parameter extraction unit is below the second threshold, the relevant frame is a noise frame (see col. 2, lines 30-55, voice activity is detected based on the comparison to a threshold. The determination of energy is random since it is not known whether the frame is voice or noise).

However, Eryilmaz does not specifically teach the use of two thresholds for comparison.

It would have been obvious to use multiple thresholds for classifying each frame so that the detection of voice and fricative frames can be detected as taught by Chong-White above. Further, the values for the thresholds used are a matter of design choice based on the thresholds computed.

10. Claims 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz as applied to claim 1 above,

and further in view of Rezayee *et al.* ("An Adaptive KLT Approach for Speech Enhancement").

As to claim 14, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz teach all of the limitations as in claim 1, above.

However, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz do not specifically teach a color noise elimination unit for eliminating color noise from voice.

Rezayee *et al.* teaches the enhancement of speech from colored noise (see Abstract).

It would have been obvious to one of ordinary skilled in the art to have combined the voice recognition as taught by Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz with the inclusion of a color noise eliminator as taught by Rezayee *et al.* the motivation to have combined the references is since colored noise consist of various noise variances and is not the same as white noise, which has same variance (see Rezayee *et al.* page 87, right column, 3rd paragraph, lines 12-17).

11. Claims 15 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor in view of Chong-White *et al.* (US 7,065,485) as applied to claims 10 and 27, above and further in view of Rezayee *et al.* ("An Adaptive KLT Approach for Speech Enhancement").

As to claims 15 and 31, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor in view of Chong-White *et al.* teach all of the limitations as in claim 1, above.

However, Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Pastor in view of Chong-White *et al.* do not specifically teach a color noise elimination unit for eliminating color noise from voice.

Rezayee *et al.* teaches the enhancement of speech from colored noise (see Abstract).

It would have been obvious to one of ordinary skilled in the art to have combined the voice recognition as taught by Kushner *et al.* in view of Durlach *et al.* in view of Eryilmaz in view of Chong-White with the inclusion of a color noise eliminator as taught by Rezayee *et al.* the motivation to have combined the references is since colored noise consist of various noise variances and is not the same as white noise, which has same variance (see Rezayee *et al.* page 87, right column, 3rd paragraph, lines 12-17). Furthermore, it should be noted that the following elimination of colored noise is being done when speech is present. Hence, the detection of a vocal frame will entail speech is present and further enhance the signal from colored noise.

Allowable Subject Matter

12. Claims 6, 16, 17, 23, 32, and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: None of the prior art alone or in combination teaches the following limitations: $NR=R/n$, as recited in claims 6 and 23; “color noise ... obtained... amount of reduction in the random parameter...due to color noise” as recited in claims 16, 17, 32, and 33.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Neti (US 5,768,474) is cited to disclose a noise robust speech processing with cochlea filters in an auditory model.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paras Shah whose telephone number is (571)270-1650. The examiner can normally be reached on MON.-THURS. 7:00a.m.-4:00p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571)272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Paras Shah/
Examiner, Art Unit 2626

03/20/2008
/Patrick N. Edouard/
Supervisory Patent Examiner, Art Unit 2626